Marathon Oil Corporation.

October 22, 2012

Eric Wortman
EPA Region VIII
1595 Wynkoop Street
Denver, CO 80202

Re: Amended Application Submittal
Steamboat Butte Operations Permit V-WR-00004-2011.00
Marathon Oil Company

Dear Mr. Wortman:

Please see the attached amended Title V application submittal for the Steamboat Butte C-1 and C-3 batteries. This modified application includes the addition of a new natural gas fired treater, change over from sour gas fuel to sweet gas fuel on two existing treaters, replacement of 3 – 1,000 bbl oil tanks with 3-500 bbl oil tanks, updated concrete tank calculations, and changes in contact information. It also includes the additional details requested regarding the operation of flares as a required and inherent part of the process at these batteries.

Per your request, Marathon provides the following information to further supplement the response provided in our May 3, 2012 letter, which addressed the question of inclusion of flare reduction efficiencies in the Potential to Emit (PTE) calculations. As noted in that response, PTE for the Steamboat Butte facility is calculated post-production and tank flare since these flares are inherent process equipment and required under federal law. That response included supporting details for each of the factors included in the November 27, 1995 letter from EPA to Intel, as requested. It also discussed the federal enforceability of the flare requirements, as outlined in the Bureau of Land Management (BLM) regulations. Additional details are included below to support this position at the Steamboat Butte C-1/C-3 facility.

In our May 3, 2012 letter, we explained why both our process and tank flare are both federally and practically enforceable, and should thus reduce PTE under the Clean Air Act. As further discussed in that letter, we highlighted the three factors that EPA uses to determine whether equipment is air pollution control equipment or inherent process equipment. These factors include: (1) whether the primary purpose of the equipment is to control air pollution, (2) whether the equipment is being used to profitably recovery product, and (3) whether the equipment would be installed if not air quality regulations are in place. *See Letter from EPA to Mr. Timothy J. Mohin, Intel Government Affairs*, dated Nov. 27, 1995 (Intel Determination); *see also Letter from EPA to Edward R. Herbert III, Director of Environmental Affairs, National Ready Mixed Concrete Association*, dated July 10, 2002 (NRMCA Determination). According to EPA, "if the answers to these questions suggest that equipment should be considered as an inherent part of the process, then the effect of the equipment or practices can be

taken into account in calculating potential emissions *regardless of whether enforceable limitations are in effect.*"

As we explained in our May letter, while the second factor described above is inapplicable to our facilities, the primary purpose of the production flare is to protect the safety of our workers, not to control air emissions. Further, the production flare would be installed whether or not regulations required such a device to be operated for safety reasons. If the production flare were to go down or be rendered inoperable, if not addressed/corrected within minutes, efforts would be initiated to shut in the facility due to the high gas volumes and associated hydrogen sulfide (H2S) present in the gas stream. It is critical that combustion of the H2S occurs for the safety of our workers and that an explosion/fire hazard is not created due to a high volume of gas being vented. These facts demonstrate that the production flare should be considered as an inherent part of the process, rather than just a control device, under EPA's guidance.

Similarly, the primary purpose of the tank flare is also to protect the safety of our workers, and would have been installed at this facility for safety reasons whether or not regulations required such a device to be operated. While the tank flare handles less volume than the production flare, the tank flare is still required to mitigate potential safety hazards that could occur. Depending on the gas volume, wind/weather conditions or work activities underway it could be necessary to shut in the facility for personnel protection measures, similar to those discussed above.

To ensure the reliability of both flares, since they are critical to our ability to operate and for individuals to work within those areas, several measures/activities are in place. A flare testing and maintenance schedule is set up within Marathon's electronic maintenance database system. This testing and maintenance is completed monthly. In addition, operators perform checks on the flare at least once daily, to ensure that the automatic igniter is firing routinely. This electric auto igniter ensures that when gas is present, it is being burned. Operators are in the battery or its vicinity multiple times daily, therefore flame presence is also verified routinely.

All individuals working within our fields are required to wear personal H2S monitors. These monitors detect the presence of H2S and alarms at over 10 parts per million (ppm). This is a notification that gas is in the area and that individuals must evacuate. If an alarm were to occur in the production facility/battery area, we would need to determine the source of the H2S. This could indicate an issue with the flare ignition and require a facility shut in as well, further illustrating the significance of the flare operation at the facility and the considerable safety impacts due to H2S.

As discussed in our May 2012 letter, Marathon is also required to comply with the BLM regulations on the tribal lands where we operate. 43 CFR Part 3160, Onshore Oil and Gas Order No.6, Hydrogen Sulfide Operations outlines the requirements that production facilities with elevated levels of H2S must comply with. One of these requirements can be seen in Section III.D.1.c of this order which says that, "At any production facility or storage tank(s) where the sustained ambient H2S concentration is in excess of 10 ppm at 50 feet from the production facility or storage tank(s) as measured at ground level under calm (1 mph) conditions, the operator shall collect or reduce vapors from the system and they shall be sold, beneficially used, reinjected, or flared provided terrain and conditions permit."

This requirement is a federally enforceable requirement for the facility that mandates the use/operation of the flares at the Steamboat Butte facility, therefore further supporting that the PTE shall be calculated post production and tank flare.

In summary, both the production and tank flares are inherent to the process due to the safety risks that uncombusted gas would pose. In addition, the flares are also required to be present based on a federally enforceable requirement.

Please feel free to contact Jacob Parker at 307-856-6228 ext. 2237 or jacobparker@marathonoil.com with any additional questions or information needs.

Sincerely,

Jennifer Satterwhite

Jennifer Satterwhite
Wyoming Asset Team HES Manager

CC:
Gary McFaddin
Compliance Partners, Inc.
4038 Timberline Road, Suite 100
Fort Collins, CO 80525

Chad Plentyhoops
Air Quality Coordinator
Wind River Environmental Quality Commission
P.O. Box 217
Fort Washakie, WY 82514

Jacob Parker

HES Files

Part 71 Operating Permit Application Revision
Steamboat Butte C1 and C3 Tank Batteries
Marathon Oil Corporation

Prepared for:

Marathon Oil Corporation
Rocky Mountain Operations
1501 Stampede Avenue
Cody, WY 82414

Prepared by:

Compliance Partners™
4038 Timberline Road, Suite 100
Fort Collins, CO 80525
970/206-4443

September 2012

Requested Changes to Existing Title V Application

A new treater is being installed at the C-1 facility; Emissions Unit SBC1B – 307, treater 5. Three treaters will be operated at the C1 facility; two 1MMBtu/hr treaters and one 2MMBtu/hr treater. All treaters will use sweet gas as fuel. The sour gas that was used by the two existing treaters for fuel is now being routed to the production flare, which is reflected in the new PTE and new production flare section. The table below shows all forms or sections that vary from those in the original application submission. Please find attached the new replacement forms/sections.

In addition to adding a new treater, three 1,000 barrel oil storage tanks are being replaced with three new 500 barrel oil storage tanks. Emissions from the oil tank battery are not expected to change significantly and vapor emissions from these tanks will still be vented to an oil tank flare. In the original application oil tank emissions were reported from the oil tank flare, so no new EUD-2 form is included or assumed to be necessary.

Marathon would also like to add an emissions unit at the C-3 facility that was previously assumed to have negligible emissions. The concrete tank located at the C-3 facility stores fluids that contain a small amount of oil that is stored and exposed to air and weathering. Oil is skimmed from the surface of the tank periodically but estimated emissions exceed the de minimis. Skimming activities could not be taken into account given the variability of tank use.

Replacement Schedule for Title V Application Revision

Form / Section to be replaced	New Form / Section
Contents both pages	New Contents both pages
GIS EPA from 5900-79	New GIS EPA from 5900-79
CTAC EPA form 5900-02	New CTAC EPA form 5900-02
PTE EPA form 5900-85	New PTE EPA form 5900-85
PTE Table following 5900-85	New PTE Table following 5900-85
FEE Form 5900-03	New Fee Form 5900-03
FF Form 5900-06	New FF Form 5900-06
Facility Actual Emissions Table For 2011	New Facility Actual Emissions TableFor 2011
IE Form 5900-83	New IE Form 5900-83
Insignificant Emissions Justification	New Insignificant Emissions Justification
Emissions Units SBC1B-305/306 C-1 Treaters 2 and 4 Entire Section	Emissions Units SBC1B-305/306/307 C-1 Treaters 2, 4 and 5 Entire Section
Emissions Unit SBC1B-510 C-1 Production Flare Entire Section	Emissions Unit SBC1B-510 C-1 Production Flare Entire Section
	Emissions Unit SBC3B-320 C-3 Concrete Storage Tank Entire Section

Operating Permit Application
Steamboat Butte C1 and C3 Tank Batteries
Marathon Oil Corporation

Contents

Operating Permit Application
Steamboat Butte C1 and C3 Tank Batteries
Marathon Oil Corporation

Contents (continued)

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

GENERAL INFORMATION AND SUMMARY (GIS)

A. Mailing Address and Contact Information

Facility name **Steamboat Butte C1 and C3 Tank Batteries**

Mailing address: Street or P.O. Box **27 Maverick Springs Rd.**

City **Kinnear** State **WY** ZIP **82516** -

Contact person: **Jacob Parker** Title **Environmental Professional**

Telephone **(307) 856 – 6228** Ext. **2237**

Facsimile **(307) 857 - 1299**

B. Facility Location

Temporary source? ___Yes **X** No Plant site location **C1 Facility: SW/4 Sec. 32, T4N, R1W**

C3 Facility: NW/4 Sec. 32, T4N, R1W

City **Kinnear** State **WY** County **Fremont** EPA Region **VIII**

Is the facility located within:

Indian lands? **X** YES ___ NO OCS waters? ___YES **X** NO

Non-attainment area? ___ YES **X** NO If yes, for what air pollutants? _____

Within 50 miles of affected State? __ YES **X** NO If yes, What State(s)? _____

C. Owner

Name **Marathon Oil** Street/P.O. Box **1501 Stampede Avenue**

City **Cody** State **WY** ZIP **82414** - _____

Telephone **(307) 527 – 6531** Ext_____

D. Operator

Name **Marathon Oil** Street/P.O. Box **1501 Stampede Avenue**

City **Cody** State **WY** ZIP **82414** - _____

Telephone **(307) 527 – 6531** Ext_____

E. Application Type

Mark only one permit application type and answer the supplementary question appropriate for the type marked.

X Initial Permit ___ Renewal ___ Significant Mod ___ Minor Permit Mod(MPM)

___ Group Processing, MPM ___ Administrative Amendment

For initial permits, when did operations commence? _____ /_____ /**Prior to 1970**

For permit renewal, what is the expiration date of current permit? _____/____/_____

F. Applicable Requirement Summary

Mark all types of applicable requirements that apply.

___ SIP ___ FIP/TIP ___ PSD ___Non-attainment NSR

___ Minor source NSR ___ Section 111 ___ Phase I acid rain ___Phase II acid rain

___ Stratospheric ozone ___ OCS regulations ___ NESHAP ___ Sec. 112(d) MACT

___ Sec. 112(g) MACT ___ Early reduction of HAP ___ Sec 112(j) MACT ___ RMP [Sec.112(r)]

___ Tank Vessel requirements, sec. 183(f)) ___ Section 129 Standards/Requirement

___ Consumer / comm.. products, ' 183(e) ___ NAAQS, increments or visibility (temp. sources)

Has a risk management plan been registered? ___YES X NO Regulatory agency _____

Phase II acid rain application submitted? ___YES X NO If yes, Permitting authority _____

G. Source-Wide PTE Restrictions and Generic Applicable Requirements

Cite and describe any emissions-limiting requirements and/or facility-wide "generic" applicable requirements.

H. Process Description

List processes, products, and SIC codes for the facility.

Process	Products	SIC
Free Water Knockout	**Produced Water, Dewatered Emulsion**	**1311**
Emulsion Treatment	**Produced Water, Crude**	**1311**

I. Emission Unit Identification

Assign an emissions unit ID and describe each emissions unit at the facility. Control equipment and/or alternative operating scenarios associated with emissions units should by listed on a separate line. Applicants may exclude from this list any insignificant emissions units or activities.

Emissions Unit ID	Description of Unit
SBC3B-500/501	**C-3 Water Storage Tank Battery**
SBC1B-305	**C-1 Treater 2**
SBC1B-306	**C-1 Treater 4**
SBC1B-307	**C-1 Treater 5**
SBC1B-510	**C-1 Production Flare**
SBC1B-507/508	**C-1 Water Storage Tank Battery**
SBC1B-511	**C-1 Oil Storage Tank Flare**
SBC3B-320	**C-3 Concrete Tank**

J. Facility Emissions Summary

Enter potential to emit (PTE) for the facility as a whole for each air pollutant listed below. Enter the name of the single HAP emitted in the greatest amount and its PTE. For all pollutants stipulations to major source status may be indicated by entering "major" in the space for PTE. Indicate the total actual emissions for fee purposes for the facility in the space provided. Applications for permit modifications need not include actual emissions information.

NOx **5.26** tons/yr VOC **66.31** tons/yr SO2 **207.34** tons/yr

PM-10 **NA** tons/yr CO **20.73** tons/yr Lead **NA** tons/yr

Total HAP **3.06** tons/yr

Single HAP emitted in the greatest amount **n-Hexane** PTE **2.2** tons/yr

Total of regulated pollutants (for fee calculation), Sec. F, line 5 of form FEE **186** tons/yr

K. Existing Federally-Enforceable Permits

Permit number(s) **None** Permit type _____ Permitting authority _____

Permit number(s) _____ Permit type _____ Permitting authority _____

L. Emission Unit(s) Covered by General Permits

Emission unit(s) subject to general permit **None**

Check one: ___ Application made ___ Coverage granted

General permit identifier _____ Expiration Date ____/____/____

M. Cross-referenced Information

Does this application cross-reference information? ___ YES **X** NO (If yes, see instructions)

INSTRUCTIONS FOLLOW

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 6/30/2015

Federal Operating Permit Program (40 CFR Part 71)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS (CTAC)

This form must be completed, signed by the "Responsible Official" designated for the facility or emission unit, and sent with each submission of documents (i.e., application forms, updates to applications, reports, or any information required by a part 71 permit).

A. Responsible Official

Name: (Last) **Whisonant** (First) **Robert** (MI) ____

Title **Operations Manager**

Street or P.O. Box **1501 Stampede Avenue**

City **Cody** State WY ZIP **82414** - ____

Telephone (**307**) **527** - **2103** Ext. ____ Facsimile (**307**) **527** - **2104**

B. Certification of Truth, Accuracy and Completeness (to be signed by the responsible official)

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in these documents are true, accurate and complete.

Name (signed) _____

Name (typed) **Robert Whisonant** Date: 10 / 22 / 12

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

POTENTIAL TO EMIT (PTE)

For each unit with emissions that count towards applicability, list the emissions unit ID and the PTE for the air pollutants listed below and sum them up to show totals for the facility. You may find it helpful to complete form **EMISS** before completing this form. Show other pollutants not listed that are present in major amounts at the facility on attachment in a similar fashion. You may round values to the nearest tenth of a ton. Also report facility totals in section **J** of form **GIS**.

Emissions Unit ID	Regulated Air Pollutants and Pollutants for which the Source is Major (tons/yr)						
	NOx	VOC	SO2	PM10	CO	Lead	HAP
SBC3B-500/501	--	**0.67**	--	--	--	--	**0.04**
SBC1B-305	**0.43**	**1.3**	**0.00**	--	**0.36**	--	**0.04**
SBC1B-305	**0.43**	**1.3**	**0.00**	--	**0.36**	--	**0.04**
SBC1B-307	**0.86**	**2.61**	**0.01**	--	**0.72**	--	**0.08**
SBC1B-510	**3.24**	**30.61**	**189.4**	--	**17.65**	--	**0.72**
SBC1B-507/508	--	**19.04**	--	--	--	--	**1.19**
SBC1B-511	**0.30**	**2.83**	**17.93**	--	**1.63**	--	**0.07**
SBC3B-320	--	**7.93**	--	--	--	--	**0.85**
Facility Totals	**5.26**	**66.31**	**207.34**	--	**20.73**	--	**3.06**

Steamboat Butte C1 and C3 Tank Batteries
Potential to Emit Summary (tpy)

Facility	ID	Unit	Throughput / Rating		NO_X	CO	VOC	n-C_6	Benzene	Toluene	Ethyl Benzene	Xylenes	SO_2	CO_2	CH_4	N_2O	CO_{2e}
C-3	SBC3B-500/501	Water Tank Vents	2400	bpd	---	---	0.67	0.04	0.00	0.00	0.00	0.00	---	1.56	0.36	0.00	9.04
	SBC3B-320	Cement Tank	400	bbl/wk			7.93	0.58	0.05	0.11	0.04	0.12		0.01	0.06	--	1.28
	SBC3B-FUG	Fugitives	8760	hr/yr	---	---	NA	0.01	0.00	0.00	0.00	0.00	---	0.11	0.15	---	3.26
Facility SubTotal					*0.00*	*0.00*	*8.61*	*0.62*	*0.05*	*0.11*	*0.04*	*0.12*	*0.00*	*1.69*	*0.57*	*0.00*	*13.58*
C-1	SBC1B-305	1MMBtu Gas Fired Treater	8760	hr/yr	0.43	0.36	1.30	0.02	0.00	0.01	0.00	0.01	0.00	535.73	2.35	0.01	588.02
	SBC1B-306	1MMBtu Gas Fired Treater	8760	hr/yr	0.43	0.36	1.30	0.02	0.00	0.01	0.00	0.01	0.00	535.73	2.35	0.01	588.02
	SBC1B-307	2MMBtu Gas Fired Treater	8760	hr/yr	0.86	0.72	2.61	0.03	0.00	0.01	0.00	0.03	0.01	1071.45	4.70	0.02	1176.04
	SBC1B-510	Production Flare	183733	scfd	3.24	17.65	30.61	0.45	0.04	0.05	0.01	0.16	189.40	7164.40	10.93	0.01	7397.23
	SBC1B-511	Oil Tank Flare	17000	scfd	0.30	1.63	2.83	0.04	0.00	0.00	0.00	0.02	17.93	662.89	1.01	0.00	684.13
	SBC1B-507/508	Water Tank Vents	68000	bpd	---	---	19.04	1.01	0.10	0.07	0.00	0.00	---	44.28	10.09	---	256.27
	SBC1B-FUG	Fugitives	8760	hr/yr	---	---	NA	0.02	0.00	0.00	0.00	0.00	---	0.33	0.46	---	10.05
Facility SubTotal					*5.26*	*20.73*	*57.70*	*1.58*	*0.16*	*0.15*	*0.02*	*0.24*	*207.34*	*10014.81*	*31.90*	*0.05*	*10699.77*
Operations Total					**5.26**	**20.73**	**66.31**	**2.20**	**0.21**	**0.26**	**0.07**	**0.36**	**207.34**	**10016.49**	**32.47**	**0.05**	**10713.36**

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

FEE CALCULATION WORKSHEET (FEE)

Use this form initially, or thereafter on an annual basis, to calculate part 71 fees.

A. General Information

Type of fee (Check one): X Initial ___Annual

Deadline for submitting fee calculation worksheet ____/____/_____

For initial fees, emissions are based on (Check one):

X Actual emissions for the preceding calendar year. (Required in most circumstances.)

___ Estimates of actual emissions for the current calendar year. (Required when operations commenced during the preceding calendar year.)

Date commenced operations ____/____/_____

___ Estimates of actual emissions for the preceding calendar year. (Optional after a part 71 permit was issued to replace a part 70 permit, but only if initial fee payment is due between January 1 and March 31; otherwise use actual emissions for the preceding calendar year.)

For annual fee payment, you are required to use actual emissions for the preceding calendar year.

B. Source Information: Complete this section only if you are paying fees but not applying for a permit.

Source or facility name _____

Mailing address: Street or P.O. Box _____

City_____ State_____ ZIP_____ - _____

Contact person_____ Title_____

Telephone (_____) _____ - _____ Ext_____ Part 71 permit no. _____

C. Certification of Truth, Accuracy and Completeness: Only needed if not submitting a separate form CTAC.

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in this submittal (form and attachments) are true, accurate and complete.

Name (signed) _____

Name (typed) **Robert Whisonant** Date: 10 / 22 / 12

D. Annual Emissions Report for Fee Calculation Purposes -- Non-HAP

You may use this to report actual emissions (tons per year) of regulated pollutants (for fee calculation) on a calendar-year basis for both initial and annual fee calculation purposes. Section E is designed to report HAP emissions. Quantify all actual emissions, including fugitives, but do not include insignificant emissions and certain regulated air pollutants that are not counted for fee purposes, such as CO (see instructions). You may round to the nearest tenth of a ton on this form. Sum the emissions in each column and enter a subtotal at the bottom of the page. If any subtotal exceeds 4,000 tons, enter 4,000 for that column.

This data is for **2011** (year)

Emission Unit ID	NOx	VOC	SO2	PM10	Lead	Other
SBC3B-500/501	---	**0.5**	---	---	---	---
SBC1B-305	**0.4**	**2.8**	**17.7**	---	---	---
SBC1B-306	**0.0**	**0.0**	**0.0**	---	---	---
SBC1B-510	**2.0**	**18.7**	**115.5**	---	---	---
SBC1B-507/508	---	**14.9**	---	---	---	---
SBC1B-511	**0.1**	**0.8**	**5.3**	---	---	---
SBC3B-320	---	**7.9**	---	---	---	---
SUBTOTALS	**2.5**	**45.6**	**138.5**			

E. Annual Emissions Report for Fee Calculation Purposes -- HAP

HAP Identification. Identify individual HAP emitted at the facility, identify the CAS number, and assign a unique identifier for use in the second table in this section. Whenever assigning identifier codes, use "HAP1" for the first, "HAP2" for the second, and so on.

Name of HAP	CAS No	Identifier
Benzene	71-43-2	HAP 1
Toluene	108-88-3	HAP 2
Ethylbenzene	100-41-4	HAP 3
Xylenes	1330-20-7	HAP 4
n-Hexane	110-54-3	HAP 5

HAP Emissions. Report the actual emissions of individual HAP identified above. Use the identifiers assigned in the table above. Include all emissions, including fugitives, and do not include insignificant emissions. You may round to the nearest tenth of a ton. Sum the emissions in each column and enter a subtotal at the bottom of the page. If any subtotal exceeds 4,000 tons, enter 4,000.

This data is for **2011** (year)

Emissions Unit ID	Actual Emissions (Tons/Year)							
	HAP 1	HAP 2	HAP 3	HAP 4	HAP 5	HAP__	HAP__	HAP__
SBC3B-500/501	0.0	0.0	0.0	0.0	0.0			
SBC1B-305	0.0	0.0	0.0	0.0	0.0			
SBC1B-306	0.0	0.0	0.0	0.0	0.0			
SBC1B-510	0.0	0.0	0.0	0.1	0.3			
SBC1B-507/508	0.1	0.1	0.0	0.0	0.8			
SBC1B-511	0.0	0.0	0.0	0.0	0.0			
SBC3B-320	0.1	0.1	0.0	0.1	0.6			
SUBTOTALS	0.2	0.2		0.2	1.7			

F. Fee Calculation Worksheet

This section is used to calculate the total fee owed for both initial and annual fee payment purposes. Reconciliation is only for cases where you are paying the annual fee and you used any type of estimate of actual emissions when you calculated the initial fee. If you do not need to reconcile fees, only complete line 1-5 and then skip down to lines 21 – 26. See instructions for more detailed explanation.

1. Sum the emissions from section D of this form (non-HAP) and enter the total (tons).	**186.6**
2. Sum the emissions from section E of this form (HAP) and enter the total (tons).	**2.3**
3. Sum lines 1 and 2.	**188.9**
4. Enter the emissions that were counted twice. If none, enter "0."	**2.3**
5. Subtract line 4 from line 3, round to the nearest ton, and enter the result here.	**186.6**

RECONCILIATION
(WHEN INITIAL FEES WERE BASED ON ESTIMATES FOR THE "CURRENT" CALENDAR YEAR)

Only complete lines 6-10 if you are paying the first annual fee and initial fees were based on estimated actual emissions for the calendar year in which you paid initial fees; otherwise skip to line 11 or to line 21.

6. Enter the total estimated actual emissions for the year the initial fee was paid (previously reported on line 5 of the initial fee form).	
7. If line 5 is greater than line 6, subtract line 6 from line 5, and enter the result. Otherwise enter "0."	
8. If line 6 is greater than line 5, subtract line 5 from line 6, and enter the result. Otherwise enter "0."	
9. If line 7 is greater than 0, multiply line 7 by last year's fee rate ($**47.11**/ton) and enter the result here. This is the underpayment. Go to line 21.	
10. If line 8 is greater than 0, multiply line 8 by last year's fee rate ($/ton) and enter the result here. This is the overpayment. Go to line 21.	

RECONCILIATION
(WHEN INITIAL FEES WERE BASED ON ESTIMATES FOR THE "PRECEDING" CALENDAR YEAR)

Only complete lines 11-20 if you are paying the first annual fee and initial fees were based on estimated actual emissions for the calendar year preceding initial fee payment; otherwise skip to line 21. If completing this section, you will also need to complete sections D and E to report actual emissions for the calendar year preceding initial fee payment.

11. Sum the actual emissions from section D (non-HAP) for the calendar year preceding initial fee payment and enter the result here.	
12. Sum the actual emissions from section E (HAP) for the calendar year preceding initial fee payment and enter the result here.	
13. Add lines 11 and 12 and enter the total here. These are total actual emissions for the calendar year preceding initial fee payment.	
14. Enter double counted emission from line 13 here. If none, enter "0."	
15. Subtract line 14 from line 13, round to the nearest ton, and enter the result here.	

16. Enter the total estimated actual emissions previously reported on line 5 of the initial fee form. These are estimated actual emissions for the calendar year preceding initial fee payment.	
17. If line 15 is greater than line 16, subtract line 16 from line 15, and enter the result here. Otherwise enter "0."	
18. If line 16 is greater than line 15, subtract line 15 from line 16, and enter the result here. Otherwise enter "0."	
19. If line 17 is greater than 0, multiply line 17 by last year's fee rate ($/ton) and enter the result here. This is the underpayment.	
20. If line 18 is greater than 0, multiply line 18 by last year's fee rate ($/ton) and enter the result on this line. This is the overpayment.	
FEE CALCULATION	
21. Multiply line 5 (tons) by the current fee rate (**$47.11**/ton) and enter the result here.	**8791**
22. Enter any underpayment from line 9 or 19 here. Otherwise enter "0."	**0***
23. Enter any overpayment from line 10 or 20 here. Otherwise enter "0."	**13,018***
24. If line 22 is greater than "0," add it to line 21 and enter the result here. If line 23 is greater than "0," subtract this from line 21 and enter the result here. Otherwise enter the amount on line 21 here. This is the fee adjusted for reconciliation.	**4,227***
25. If your account was credited for fee assessment error since the last time you paid fees, enter the amount of the credit here. Otherwise enter "0."	
26. Subtract line 25 from line 24 and enter the result here. Stop here. This is the total fee amount that you must remit to EPA.	

* A fee of $13,018 was submitted with original application, the most recent title V application submitted in May 2012 indicated only $8,527 was owed and a refund of $4,491 was due. Now with this revision an additional $264 is owed to the EPA so the refund should be adjusted to $4,227.

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

FEE FILING FORM (FF)

Complete this form each time you prepare form **FEE** and send this form to the appropriate lockbox bank address, along with full payment. This form required at time of initial fee payment, and thereafter, when paying annual fees.

Source or Facility Name **Steamboat Butte C1 and C3 Tank Batteries**

Source Location **Section 32, Township 4 North, Range 1 West**

EPA Region where Source Located **VIII**

Mailing Address:

Street/P.O. Box **27 Maverick Springs Rd.** City **Kinnear**

State **WY** ZIP **82516** - _____

Contact Person: **Jacob Parker** Title **Environmental Professional**

Telephone (**307**) **856** - **6228** Ext. **2237**

Total Fee Payment Remitted: $ 13018.00 Remitted with November 2011 Application

$ 8791.00 Present Application Fee Calculation
$ 4,227 refund instead of previously indicated $4,491
No Remittance Made with Present Application

Steamboat Butte C1 and C3 Tank Batteries
2011 Actual Emissions
(tpy)

Facility	ID	Unit	Throughput / Rating		2011 Actual Throughput		NO_X	CO	VOC	n-C_6	Benzene	Toluene	Ethyl Benzene	Xylenes	SO_2	CO_2	CH_4	N_2O	CO_{2e}
C-3	SBC3B-500/501	Water Tank Vents	2400	bpd	1837	bpd	---	---	0.51	0.03	0.00	0.00	0.00	0.00	---	1.20	0.27	0.00	6.92
	SBC3B-320	Cement Tank	400	bbl/wk			---	---	7.93	0.58	0.05	0.11	0.04	0.12	---	0.01	0.06	---	1.28
	SBC3B-FUG	Fugitives	8760	hr/yr			---	---	NA	0.01	0.00	0.00	0.00	0.00	---	0.11	0.15	---	3.26
Facility SubTotal							*0.00*	*0.00*	*8.45*	*0.61*	*0.05*	*0.11*	*0.04*	*0.12*	*0.00*	*1.32*	*0.48*	*0.00*	*11.46*
C-1	SBC1B-305	Gas Fired Treater	8760	hr/yr	8760	hr/yr	0.43	0.36	2.81	0.02	0.00	0.01	0.00	0.01	17.74	511.97	0.01	0.00	512.47
	SBC1B-306	Gas Fired Treater	8760	hr/yr	0	hr/yr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SBC1B-510	Production Flare	183733	scfd	112000	scfd	1.98	10.76	18.66	0.27	0.03	0.03	0.01	0.10	115.45	4367.29	6.66	0.01	4509.22
	SBC1B-511	Oil Tank Flare	17000	scfd	5000	scfd	0.09	0.48	0.83	0.01	0.00	0.00	0.00	0.00	5.27	194.97	0.30	0.00	201.22
	SBC1B-507/508	Water Tank Vents	68000	bpd	53139	bpd	---	---	14.88	0.79	0.08	0.06	0.00	0.00	---	34.60	7.89	---	200.26
	SBC1B-FUG	Fugitives	8760	hr/yr			---	---	NA	0.02	0.00	0.00	0.00	0.00	---	0.33	0.46	---	10.05
Facility SubTotal							*2.50*	*11.60*	*37.18*	*1.11*	*0.11*	*0.10*	*0.01*	*0.12*	*138.47*	*5109.16*	*15.32*	*0.01*	*5433.22*
Operations Total							**2.50**	**11.60**	**45.63**	**1.72**	**0.16**	**0.21**	**0.06**	**0.24**	**138.47**	**5110.48**	**15.81**	**0.01**	**5444.68**

United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

INSIGNIFICANT EMISSIONS (IE)

On this page list each insignificant activity or emission unit. In the "number" column, indicate the number of units in this category. Descriptions should be brief but unique. Indicate which emissions criterion of part 71 is the basis for the exemption.

Number	Description of Activities or Emissions Units	RAP, except HAP	HAP
1	**C-3 Facility Fugitive Emission Leaks**	X	X
1	**C-1 Facility Fugitive Emission Leaks**	X	X
3	**Pop and Rupture Tanks (2 at C-1 and 1 at C-3)**	X	X
1	**Concrete Tank at C-3**	X	X

Insignificant Activities

Insignificant activities and the C1 and C3 facilities include fugitive equipment leaks, pop and rupture tanks and a concrete tank.

Fugitive Equipment Leaks

A field piping component inventory was conducted in Spring 2011 by Marathon operators. The emission factors reported in 1995 Protocol for Equipment Leak Emission Estimate (EPA-453/R-95-017) Table 2-4: Oil and Gas Production Operations Average Emission Factors were applied to the resulting count. The emission estimate is summarized below:

Steamboat Butte C-3 Fugitive Emission Calculations

Service	Component	Current Count	Emission factor (lb/component/hr)	VOC Wt. (%)	VOC		CO_2		CH_4		CO_{2e}	
					(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
					Wt. % = 49.51		Wt. % = 12.67		Wt. % = 17.68			
Gas	Valves	13	0.00992	49.51	0.06	0.28	0.02	0.07	0.02	0.10	0.50	2.17
	Connectors	6	0.00044	49.51	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.04
	Flanges	29	0.00086	49.51	0.01	0.05	0.00	0.01	0.00	0.02	0.10	0.42
	Other	1	0.01940	49.51	0.01	0.04	0.00	0.01	0.00	0.02	0.07	0.33
	Open End	4	0.00441	49.51	0.01	0.04	0.00	0.01	0.00	0.01	0.07	0.30
	Pump Seals	0	0.00529	49.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Wt. % = 100.00		Wt. % = 0.00		Wt. % = 0.00			
Light Oil	Valves	0	0.00551	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Connectors	0	0.00046	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Flanges	0	0.00024	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other	0	0.01653	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	0	0.00309	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pump Seals	0	0.02866	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Wt. % = 100.00		Wt. % = 0.00		Wt. % = 0.00			
Heavy Oil	Valves	143	0.0000185	100.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Connectors	163	0.0000165	100.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Flanges	370	0.0000009	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other	4	0.000071	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	2	0.000309	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pump Seals	3	NA	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Wt. % = 10.00		Wt. % = 0.00		Wt. % = 0.00			
Produced Water	Valves	35	0.000216	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Connectors	46	0.000243	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Flanges	42	0.000006	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other	2	0.030865	10.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	2	0.000551	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pump Seals	1	0.000053	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		866			**0.11**	**0.5**	**0.0**	**0.1**	**0.0**	**0.1**	**0.7**	**3.3**

*Factors from 1995 Protocol for Equipment Leak Emission Estimate (EPA-453/R-95-017) Table 2-4: Oil and Gas Production Operations Average Emission Factors

C-3 Fugitive HAP Emissions

Component	lb/yr	TPY
n-C_6	0.00	0.01
Benzene	0.00	0.00
Toluene	0.00	0.00
Ethyl Benzene	0.00	0.00
Xylene	0.00	0.00

Steamboat Butte C-1 Fugitive Emission Calculations

Service	Component	Current Count	Emission factor* (lb/component/hr)	VOC		CO_2		CH_4		CO_{2e}	
				(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
				Wt. % = 49.51		Wt. % = 12.67		Wt. % = 17.68			
Gas	Valves	48	0.00992	0.24	1.03	0.06	0.26	0.08	0.37	1.83	8.01
	Connectors	191	0.00044	0.04	0.18	0.01	0.05	0.01	0.07	0.32	1.41
	Flanges	23	0.00086	0.01	0.04	0.00	0.01	0.00	0.02	0.08	0.33
	Other	0	0.01940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	4	0.00441	0.01	0.04	0.00	0.01	0.00	0.01	0.07	0.30
	Pump Seals	0	0.00529	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Wt. % = 100.00		Wt. % = 0.00		Wt. % = 0.00			
Light Oil	Valves	0	0.00551	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Connectors	0	0.00046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Flanges	0	0.00024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other	0	0.01653	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	0	0.00309	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pump Seals	0	0.02866	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Wt. % = 100.00		Wt. % = 0.00		Wt. % = 0.00			
Heavy Oil	Valves	36	0.0000185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Connectors	124	0.0000165	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Flanges	33	0.0000009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other	0	0.000071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	3	0.000309	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pump Seals	0	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Wt. % = 10.00		Wt. % = 0.00		Wt. % = 0.00			
Produced Water	Valves	260	0.000216	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	Connectors	518	0.000243	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00
	Flanges	535	0.000006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other	15	0.030865	0.05	0.20	0.00	0.00	0.00	0.00	0.00	0.00
	Open End	23	0.000551	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Pump Seals	4	0.000053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1817		**0.37**	**1.6**	**0.1**	**0.3**	**0.1**	**0.5**	**2.3**	**10.1**

*Factors from 1995 Protocol for Equipment Leak Emission Estiamte (EPA-453/R-95-017) Table 2-4: Oil and Gas Production Operations Average Emission Factors

C-1 Fugitive HAP Emissions

Component	lb/yr	TPY
n-C_6	0.00	0.02
Benzene	0.00	0.00
Toluene	0.00	0.00
Ethyl Benzene	0.00	0.00
Xylene	0.00	0.00

Pop and Rupture Tanks

These tanks (two located at the C-1 battery and on located at the C-3 battery) are utilized as vessel pressure relief containment. The pressure relief system for vessels located at these facilities direct the production stream (fluids and gas) to the pop and rupture tanks should the pressure of any of these vessels reach set pressure levels that approach the pressure rating of the subject vessel. This system directs the production to a safe location and prevents liquid releases. Pressure relief situations are upset type of occurrences that cannot be predicted and do not occur routinely. The pop and rupture tanks located at the C-1 facility also serve as liquid flare knock-

out. Volumes sent to the pop and rupture tanks are accounted for in the facility throughputs utilized for emission calculations.

Concrete Tank

One concrete tank at the C3 facility is used to store and mix petroleum contaminated soils and other production materials until approval is secured to utilize it for road mix application. The use of this tank is highly variable and infrequent. The petroleum species present in these soil mixtures are of high molecular weight with low vapor pressures, and as such emission potential from this tank should be insignificant.

Emissions Units SBC1B-305/306/307
C-1 Treaters 2, 4 and 5

EPA United States Environmental Protection Agency

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID **SBC1B-305** Description **C-1 Treater 2**

SIC Code (4-digit) **1311** SCC Code **31000107**

B. Emissions Unit Description

Primary use **Oil/Water Separation** Temporary Source ___Yes **X** No

Manufacturer **National Tank Company** Model No. _____

Serial No. _____ Installation date **Pre-1996**

Boiler Type: ___ Industrial boiler **X** Process burner ___ Electric utility boiler

Other (describe) ___

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input _____MM BTU/hr Max. Design Heat Input **1.0** MM BTU/hr

C. Fuel Data

Primary fuel type(s) **Sweet Produced Gas** Standby fuel type(s)_____

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Sweet Produced Gas	**.0004 mole % H_2S**	**Minimal**	**1300 Btu/scf**

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Sweet Produced Gas	**N/A**	**784.7 scf**	**6.7MMscf**

E. Associated Air Pollution Control Equipment

Emissions unit ID **None** Device type_____

Air pollutant(s) Controlled_____ Manufacturer_____

Model No._____ Serial No._____

Installation date_____/_____/_____ Control efficiency (%) _____

Efficiency estimation method_____

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____._____ Inside stack diameter (ft) _____._____

Stack temp(°F) _____._____ Design stack flow rate (ACFM) _____._____

Actual stack flow rate (ACFM) _____._____ Velocity (ft/sec) _____._____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID SBC1B-305

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NO_X	**0.43**	**0.10**	**0.43**	
CO	**0.36**	**0.08**	**0.36**	
VOC	**2.81**	**0.30**	**1.3**	
SO_2	**17.74**	**0.001**	**0.003**	
Benzene	**<0.01**	**<0.01**	**<0.01**	**71-43-2**
Toluene	**<0.01**	**<0.01**	**<0.01**	**108-88-3**
Ethylbenzene	**<0.01**	**<0.01**	**<0.01**	**100-41-4**
Xylenes	**<0.01**	**<0.01**	**<0.01**	**1330-20-7**
n-Hexane	**<0.01**	**<0.01**	**<0.01**	**110-54-3**

CO_2	511.97	122.31	535.73	
CH_4	0.01	.537	2.351	
CO_{2e}	512.47	134.251	588.02	

EPA United States Environmental Protection Agency

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID **SBC1B-306** Description **C-1 Treater 4**

SIC Code (4-digit) **1311** SCC Code **31000107**

B. Emissions Unit Description

Primary use **Oil/Water Separation** Temporary Source ___Yes **X** No

Manufacturer **National Tank Company** Model No. _____

Serial No. _____ Installation date **Pre-1996**

Boiler Type: ___ Industrial boiler **X** Process burner ___ Electric utility boiler

Other (describe) ___

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input _____MM BTU/hr Max. Design Heat Input **1.0** MM BTU/hr

C. Fuel Data

Primary fuel type(s) **Sweet Produced Gas** Standby fuel type(s)_____

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Sweet Produced Gas	**.0004 mole % H_2S**	**Minimal**	**1300 Btu/scf**

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Sweet Produced Gas	**N/A**	**784.7 scf**	**6.7MMscf**

E. Associated Air Pollution Control Equipment

Emissions unit ID **None** Device type_____

Air pollutant(s) Controlled_____ Manufacturer_____

Model No._____ Serial No._____

Installation date_____/_____/_____ Control efficiency (%) _____

Efficiency estimation method_____

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____._____ Inside stack diameter (ft) _____._____

Stack temp(°F) _____._____ Design stack flow rate (ACFM) _____._____

Actual stack flow rate (ACFM) _____._____ Velocity (ft/sec) _____._____

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID SBC1B-306

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NO_X	**0.43**	**0.10**	**0.43**	
CO	**0.36**	**0.08**	**0.36**	
VOC	**2.81**	**0.30**	**1.3**	
SO_2	**17.74**	**0.001**	**0.003**	
Benzene	**<0.01**	**<0.01**	**<0.01**	**71-43-2**
Toluene	**<0.01**	**<0.01**	**<0.01**	**108-88-3**
Ethylbenzene	**<0.01**	**<0.01**	**<0.01**	**100-41-4**
Xylenes	**<0.01**	**<0.01**	**<0.01**	**1330-20-7**
n-Hexane	**<0.01**	**<0.01**	**<0.01**	**110-54-3**

CO_2	511.97	122.31	535.73	
CH_4	0.01	.537	2.351	
CO_{2e}	512.47	134.251	588.02	

United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID **SBC1B-307** Description **C-1 Treater 5**

SIC Code (4-digit) **1311** SCC Code **31000107**

B. Emissions Unit Description

Equipment type **Oil/Water Separation** Temporary source: ___Yes **X** N

Manufacturer **NATCO** Model No. _____

Serial Number _____ Installation Date ___/___/ **AUG 2012**

Boiler Type: ___ Industrial boiler **X** Process burner ___ Electric utility boiler

Other (describe) _____

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input _____MM BTU/hr Max. Design Heat Input **2.0** MM BTU/hr

C. Fuel Data

Primary fuel type(s) **Sweet Produced Gas** Standby fuel type(s) _____

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Sweet Produced Gas	**.0004 mole%**		**1,300 Btu/scf**

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Sweet Produced Gas		**1569.5 scf**	**13.5 MMscf**

E. Associated Air Pollution Control Equipment

Emissions unit ID **None** Device type _____

Air pollutant(s) Controlled _____ Manufacturer _____

Model No. _____ Serial No. _____

Installation date ____/____/_____ Control efficiency (%) _____

Efficiency estimation method _____

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____._____ Inside stack diameter (ft) _____._____

Stack temp(°F) _____._____ Design stack flow rate (ACFM) _____._____

Actual stack flow rate (ACFM) _____._____ Velocity (ft/sec) _____._____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID **SBC1B-307**

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NOX	**New**	**0.196**	**0.859**	
CO	**New**	**0.165**	**0.721**	
VOC	**New**	**0.596**	**2.609**	
SO2	**New**	**0.001**	**0.006**	
Benzene	**New**	**0.001**	**0.003**	**71-43-2**
Toluene	**New**	**0.002**	**0.010**	**108-88-3**
Ethylbenzene	**New**	**0.001**	**0.002**	**100-41-4**
Xylenes	**New**	**0.007**	**0.029**	**1330-20-7**
n-Hexane	**New**	**0.008**	**0.034**	**110-54-3**
CO_2	**New**	**244.6**	**1071.5**	
CH_4	**New**	**1.1**	**4.7**	
CO_2e	**New**	**292.94**	**1283.1**	

C-1 Treaters 2, 4 and 5 Emissions Calculations

A new 2MMBtu/hr treater is being installed in addition to the two existing 1MMBtu/hr treaters at the C-1 facility. The new 2MMBtu/hr treater is equipped with two fire tubes each with a 1 MMBtu/hr burner. The new treater will use sweet gas for combustion and the two existing treaters will be switched from sour gas to sweet gas. Emissions are estimated utilizing emission factors taken from AP-42, Table 1.4-2 for NOx and CO. Emissions of VOC and HAP constituents are considered combusted at a 98 percent efficiency.

Basis (per individual unit)

Unit(s)	SBC1B-305, 306	
Type	<100 MMBTU/hr	
Hours of Operation		8760 hrs
Fuel Heat Content (LHV)		1300.31 BTU/SCF
Heat Input Rate		1.0 MMBtu/hr
Annual Heat Input		8760 MMBtu
Annual Fuel Consumption		6.7 MMscf

HAP,VOC, and CO2 emission factors calculated from material balance assuming 98% burner efficiency
Criteria Pollutant Emission Factors From AP-42 1.4.1 (Small Boilers), 1.4.2 and 1.4.3
SO_2 Emission Factor Calculated assuming 4ppm H_2S pipeline quality natural gas
N_2O Emission Factors From 40 CFR 98, Subpart C, Table C-1 & C-2
Greenhouse Global Warming Potential From 40 CFR 98, Subpart A, Table A-1

Emissions Estimate

Constituent	Emission Factors		Emissions	
	lb/MMscf	lb/MMBtu	lb/hr	tpy
NO_X	100.000	0.098	0.098	0.429
CO	84.000	0.082	0.082	0.361
VOC	387.247	0.298	0.298	1.304
SO_2	0.662	0.001	0.001	0.003
Benzene	0.495	0.0004	0.000	0.002
Toluene	1.556	0.001	0.001	0.005
Ethylbenzene	0.336	0.000	0.000	0.001
Xylenes	4.258	0.003	0.003	0.014
n-Hexane	5.047	0.004	0.004	0.017
Total HAP	---	0.009	0.000	0.000
CO_2	159043.677	122.3119	122.312	535.73
N_2O	2.2	0.0022	0.002	0.009
CH_4	697.9	0.5367	0.537	2.351
CO_{2e}	---	---	134.251	588.02

Steamboat Butte C-1 Treater Heater Emissions

New Treater added 2012

Basis (per individual unit)

Unit(s)	SBC1B-307	
Type	<100 MMBTU/hr	
Hours of Operation	8760	hrs
Fuel Heat Content (LHV)	1300.31	BTU/SCF
Heat Input Rate	2.0	MMBtu/hr
Annual Heat Input	17520	MMBtu
Annual Fuel Consumption	13.5	MMscf

HAP,VOC, and CO2 emission factors calculated from material balance assuming 98% burner efficiency

Criteria Pollutant Emission Factors From AP-42 1.4.1 (Small Boilers), 1.4.2 and 1.4.3

SO_2 Emission Factor Calculated assuming 4ppm H_2S pipeline quality natural gas

N_2O Emission Factors From 40 CFR 98, Subpart C, Table C-1 & C-2

Greenhouse Global Warming Potential From 40 CFR 98, Subpart A, Table A-1

Emissions Estimate

Constituent	Emission Factors		Emissions	
	lb/MMscf	lb/MMBtu	lb/hr	tpy
NO_X	100.000	0.098	0.196	0.859
CO	84.000	0.082	0.165	0.721
VOC	387.247	0.298	0.596	2.609
SO_2	0.662	0.00065	0.001	0.006
Benzene	0.495	0.0004	0.001	0.003
Toluene	1.556	0.001	0.002	0.010
Ethylbenzene	0.336	0.000	0.001	0.002
Xylenes	4.258	0.003	0.007	0.029
n-Hexane	5.047	0.004	0.008	0.034
Total HAP	---	---	1.80E-02	0.079
CO_2	159043.677	122.3119	244.62	1071.45
N_2O	2.200	0.0022	0.00	0.019
CH_4	697.890	0.5367	1.07	4.702
CO_{2e}	---	---	268.50	1176.04

Emission Factors Based on Sweet Gas Combustion With 98% Efficiency

Sweet Gas Composition			
Component	**Mole %**	**Btu/scf**	**MW**
Nitrogen	2.410	0.0	28
CO2	0.110	0.0	44
Methane	82.440	1010.0	16.042
Ethane	3.270	1769.6	30.07
Propane	4.198	2518.7	44.1
i-Butane	1.202	3257.5	58.12
n-Butane	2.089	3265.3	58.12
i-Pentane	1.099	4002.5	72.15
n-Pentane	0.976	4011.5	72.15
Hexanes	0.983	4758.2	86.17
n-Heptane	0.803	5506.3	100.21
Benzene	0.012	3745.2	78.11
Toluene	0.032	4478.6	92.14
Ethylbenzene	0.006	5226.7	106.17
p-Xylene	0.076	5213.3	106.17
n-Octane	0.165	6253.1	114.23
n-Nonane	0.012	6997.6	128.2
n-Hexane	0.111	4758.2	86.17

VOC Emission Factor Calculation

$$\text{VOC EF } 0.298\frac{lb\ VOC}{MMBtu} = \frac{\left(11.754\frac{C_3{}^{+}moles}{100\ moles}\right)\left(62.380\frac{lb\ VOC}{lb\ mole}\right)\left(\frac{1000000scf}{MMscf}\right)}{\left(379\frac{scf}{lb\ mole}\right)\left(1300.3\frac{MMBtu}{MMscf}\right)}\left(1-\frac{98\%}{100}\right)$$

Benzene Emission Factor Calculation

$$\text{Benzene EF } 0.00038\frac{lb}{MMBtu} = \frac{\left(0.012\frac{moles}{100\ moles}\right)\left(78.11\frac{lb}{lb\ mole}\right)\left(\frac{1000000scf}{MMscf}\right)}{\left(379\frac{scf}{lb\ mole}\right)\left(1300.3\frac{MMBtu}{MMscf}\right)}\left(1-\frac{98\%}{100}\right)$$

Toluene Emission Factor Calculation

$$\text{Toluene EF } 0.0012\ \frac{lb}{MMBtu} = \frac{\left(0.032\frac{moles}{100\ moles}\right)\left(92.14\frac{lb}{lb\ mole}\right)\left(\frac{1000000scf}{MMscf}\right)}{\left(379\frac{scf}{lb\ mole}\right)\left(1300.3\frac{MMBtu}{MMscf}\right)}\left(1-\frac{98\%}{100}\right)$$

SO_2 Emission Factor Calculation

$$\text{SO}_2 \text{ EF } 0.00065 \ \frac{lb}{MMBtu} = \frac{\left(0.0004 \frac{moles\ H_2S}{100\ moles}\right)\left(64 \frac{lb}{lb\ mole}\right)\left(\frac{1000000 scf}{MMscf}\right)\left(\frac{98\%}{100}\right)}{\left(379 \frac{scf}{lb\ mole}\right)\left(1300.3 \frac{MMBtu}{MMscf}\right)}$$

Xylene Emission Factor Calculation

$$\text{Xylene EF } 0.0033 \ \frac{lb}{MMBtu} = \frac{\left(0.076 \frac{moles}{100\ moles}\right)\left(106.17 \frac{lb}{lb\ mole}\right)\left(\frac{1000000 scf}{MMscf}\right)}{\left(379 \frac{scf}{lb\ mole}\right)\left(1300.3 \frac{MMBtu}{MMscf}\right)}\left(1 - \frac{98\%}{100}\right)$$

n-Hexane Emission Factor Calculation

$$\text{nHexane EF } 0.004 \ \frac{lb}{MMBtu} = \frac{\left(0.111 \frac{moles}{100\ moles}\right)\left(86.17 \frac{lb}{lb\ mole}\right)\left(\frac{1000000 scf}{MMscf}\right)}{\left(379 \frac{scf}{lb\ mole}\right)\left(1300.3 \frac{MMBtu}{MMscf}\right)}\left(1 - \frac{98\%}{100}\right)$$

Ethyl Benzene Emission Factor Calculation

$$\text{Ethylbenzene } 0.00026 \ \frac{lb}{MMBtu} = \frac{\left(0.006 \frac{moles}{100\ moles}\right)\left(106.17 \frac{lb}{lb\ mole}\right)\left(\frac{1000000 scf}{MMscf}\right)}{\left(379 \frac{scf}{lb\ mole}\right)\left(1300.3 \frac{MMBtu}{MMscf}\right)}\left(1 - \frac{98\%}{100}\right)$$

CO_2 Emission Factor Calculation

$$\text{CO}_2 \text{ EF } 122.3 \ \frac{lb}{MMBtu} = \frac{\left(0.110 \frac{moles CO_2}{100\ moles} + 1.397 \frac{moles\ C}{mole\ feed\ gas} * \frac{98\%}{100}\right)\left(44 \frac{lb}{lb\ mole}\right)\left(\frac{1000000 scf}{MMscf}\right)}{\left(379 \frac{scf}{lb\ mole}\right)\left(1300.3 \frac{MMBtu}{MMscf}\right)}$$

Methane Emission Factor Calculation

$$\text{Methane EF } 0.537 \ \frac{lb}{MMBtu} = \frac{\left(82.44 \frac{moles}{100\ moles}\right)\left(16 \frac{lb}{lb\ mole}\right)\left(\frac{1000000 scf}{MMscf}\right)}{\left(379 \frac{scf}{lb\ mole}\right)\left(1300.3 \frac{MMBtu}{MMscf}\right)}\left(1 - \frac{98\%}{100}\right)$$

Emissions using emission factors for all Treaters

$$pollutant \ \frac{lb}{hour} = Ef_i \frac{lb}{MMBtu} * heat\ input\ rate \ \frac{MMBtu}{hr}$$

Emission Unit SBC1B-510
C-1 Production Flare

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 04/30/2012

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID **SBC1B-510** Description **C-1 Production Flare**

SIC Code (4-digit) **1311** SCC Code **31000160**

B. Emissions Unit Description

Primary use **Combustion of Produced Gas to Reduce Worker Exposure to H_2S** Temporary Source ___Yes **X** No

Manufacturer **Custom** Model No. _____

Serial No. _____ Installation date ____/____/ **2000**

Boiler Type: ___ Industrial boiler ___ Process burner ___ Electric utility boiler

Other (describe) **Safety Flare**

Boiler horsepower rating_____ Boiler steam flow (lb/hr)_____

Type of Fuel-Burning Equipment (coal burning only):

___ Hand fired ___Spreader stoker ___Underfeed stoker ___Overfeed stoker

___ Traveling grate ___Shaking grate ___Pulverized, wet bed ___ Pulverized, dry bed

Actual Heat Input _____MM BTU/hr Max. Design Heat Input **9.0** MM BTU/hr

C. Fuel Data

Primary fuel type(s) **Produced Gas** Standby fuel type(s)_____

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Produced Gas	**3.4 vol % H_2S**	**Minimal**	**1,423 Btu/scf**

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Produced Gas		**7,656 scfh**	**67.1 MMscfy**

E. Associated Air Pollution Control Equipment

Emissions unit ID **None** Device type_____

Air pollutant(s) Controlled_____ Manufacturer_____

Model No._____ Serial No._____

Installation date_____/_____/_____ Control efficiency (%) _____

Efficiency estimation method_____

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____._____ Inside stack diameter (ft) _____._____

Stack temp(°F) _____._____ Design stack flow rate (ACFM) _____._____

Actual stack flow rate (ACFM) _____._____ Velocity (ft/sec) _____._____

United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 04/30/2012

Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID SBC1B-510

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NO_X	**1.98**	**0.74**	**3.24**	
CO	**10.76**	**4.03**	**17.65**	
VOC	**18.66**	**6.99**	**30.61**	
SO_2	**115.45**	**43.24**	**189.40**	
Benzene	**0.03**	**0.01**	**0.04**	**71-43-2**
Toluene	**0.03**	**0.01**	**0.05**	**108-88-3**
Ethylbenzene	**0.01**	**<0.01**	**0.01**	**100-41-4**
Xylenes	**0.10**	**0.04**	**0.16**	**1330-20-7**
n-Hexane	**0.27**	**0.10**	**0.45**	**110-54-3**

CO_2	4367.29	1546.27	6772.65	
CH_4	6.66	2.5	10.93	
CO_{2e}	4509.22	1688.87	7397.23	

C-1 Production Flare

These new flare calculations reflect an increase in sour gas flow rate from 6250 scf/hr to 7656 scf/hr. The extra gas was being utilized by two 1MMBtu/hr treaters that no longer use the sour gas as fuel.

The C-1 Production Flare is a custom made device manufactured by Marathon and does not have published manufacturer's specifications. A destruction rate efficiency of 98% for BTEX and VOCs was utilized in the amended permit application since the flare meets the requirements of 40 CFR 60.18(b). NO_X and CO components are a direct result of hydrocarbon destruction by the flare and as such are not controlled by the unit. NO_X and CO emissions have been calculated with a flare gas sample and EPA AP-42 emission factors for Flare Operations (Table 13.5-1). Greenhouse gas emissions have been calculated by the methodologies set forth by 40 CFR 98, Subpart W flare emission calculation.

Steamboat Butte C-1 Production Flare Emissions

Component	lb/mole	Btu/scf	Carbon	Flare Feed (mol %)	CO_2 Combustion Volumes (scfh)
N_2	28	0	0	10.696	0.0
CO_2	44	0	1	10.063	770.4
H_2S	34	639	0	3.413	0.0
C_1	16	909	1	38.614	2897.0
C_2	30	1619	2	9.604	1441.0
C_3	44	2315	3	8.908	2005.0
i-C_4	58	3011	4	2.928	878.6
n-C_4	58	3011	4	5.296	1589.3
i-C_5	72	3707	5	3.215	1206.0
n-C_5	72	3707	5	2.232	837.4
C_6	86	4404	6	2.651	1193.2
C_7	100	5100	7	1.485	779.9
C_8	114	5796	8	0.353	211.6
C_9	128	6493	9	0.087	59.0
C_{10}	142	7190	10	0.000	0.0
C_{11}^+	156	8283	11	0.000	0.0
Benzene	78	3591	6	0.031	14.1
Toluene	92	4274	7	0.033	17.2
E-Benzene	106	4970	8	0.007	4.3
Xylenes	106	4956	8	0.088	52.6
n-C_6	86	4404	6	0.295	132.6
Total	34.941			100.000	14089.39
VOC MW (lb/mol)	62.656				
Flare DRE (%)				98.00	
scfh				7656	
Energy Rate MMBTU/hr				10.89	
BTU/scf				1423	
NOx Emission Factor		0.068		lb/MMBTU	
CO Emission Factor		0.37		lb/MMBTU	

Flare emission factors obtained from AP 42 Table 13.5-1 Emission Factors for Flare Operations

Steamboat Butte C-1 Production Flare Emissions

Criteria Pollutant Emissions

NO_X	(lb/hr)	0.74
	(tpy)	3.24
CO	(lb/hr)	4.03
	(tpy)	17.65
VOC	(lb/hr)	6.99
	(tpy)	30.61
SO_2	(lb/hr)	43.24
	(tpy)	189.40

Heat of Combustion

$$\text{Heat of Combustion } \frac{Btu}{scf} = \left(\sum_i \left(C_i \frac{mol\ \%}{100}\right)\left(H_i \frac{Btu}{scf}\right)\right) = 1{,}423 \frac{Btu}{scf}$$

NO_X Emission Rate (AP42, Table 13.5-1)

$$\text{NO}_X \text{ Emission Rate } \frac{lb}{hr} = \frac{\left(0.068 \frac{lb}{MMBtu}\right)\left(1{,}423 \frac{Btu}{scf}\right)\left(7{,}656 \frac{scf}{hr}\right)}{\left(10^6 \frac{Btu}{MMBtu}\right)} = 0.74 \frac{lb}{hr}$$

CO Emission Rate (AP42, Table 13.5-1)

$$\text{CO Emission Rate } \frac{lb}{hr} = \frac{\left(0.37 \frac{lb}{MMBtu}\right)\left(1{,}423 \frac{Btu}{scf}\right)\left(7{,}656 \frac{scf}{hr}\right)}{\left(10^6 \frac{Btu}{MMBtu}\right)} = 4.03 \frac{lb}{hr}$$

VOC Emission Rate

$$\text{VOC Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656 \frac{scf}{hr}\right)\left(27.61 \frac{moles\ VOC}{100\ moles}\right)\left(62.565 \frac{lb\ VOC}{mole\ VOC}\right)}{\left(379 \frac{scf}{mole}\right)}\left(1 - \frac{98\%}{100}\right) = 6.99 \frac{lb}{hr}$$

SO_2 Emission Rate

$$\text{SO}_2 \text{ Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656 \frac{scf}{hr}\right)\left(3.413 \frac{moles\ H_2S}{100\ moles}\right)\left(1 \frac{mole\ SO_2}{mole\ H_2S}\right)\left(64 \frac{lb\ SO_2}{mole\ SO_2}\right)\left(\frac{98\%}{100}\right)}{\left(379 \frac{scf}{mole}\right)} = 43.24 \frac{lb}{hr}$$

HAP Pollutant Emissions		
Total HAP	(lb/hr)	0.17
	(tpy)	0.72
Benzene	(lb/hr)	0.01
	(tpy)	0.04
Toluene	(lb/hr)	0.01
	(tpy)	0.05
E-Benzene	(lb/hr)	0.00
	(tpy)	0.01
Xylenes	(lb/hr)	0.04
	(tpy)	0.16
n-Hexane	(lb/hr)	0.10
	(tpy)	0.45

n-C_6 Emission Rate

$$\text{nC}_6 \text{ Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(0.295\frac{moles}{100\ moles}\right)\left(86\frac{lb}{mole}\right)}{\left(379\frac{scf}{mole}\right)}\left(1-\frac{98\%}{100}\right) = 0.10\ \frac{lb}{hr}$$

Benzene Emission Rate

$$\text{Benzene Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(0.031\frac{moles}{100\ moles}\right)\left(78\frac{lb}{mole}\right)}{\left(379\frac{scf}{mole}\right)}\left(1-\frac{95\%}{100}\right) = 0.01\ \frac{lb}{hr}$$

Toluene Emission Rate

$$\text{Toluene Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(0.033\frac{moles}{100\ moles}\right)\left(92\frac{lb}{mole}\right)}{\left(379\frac{scf}{mole}\right)}\left(1-\frac{98\%}{100}\right) = 0.01\ \frac{lb}{hr}$$

Ethyl Benzene Emission Rate

$$\text{Ethyl Benzene Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(0.007\frac{moles}{100\ moles}\right)\left(106\frac{lb}{mole}\right)}{\left(379\frac{scf}{mole}\right)}\left(1-\frac{98\%}{100}\right) = 0.003\frac{lb}{hr}$$

Xylene Emission Rate

$$\text{Xylene Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(0.088\frac{moles}{100\ moles}\right)\left(106\frac{lb}{mole}\right)}{\left(379\frac{scf}{mole}\right)}\left(1-\frac{98\%}{100}\right) = 0.04\ \frac{lb}{hr}$$

Greenhouse Gas Pollutant Emissions		
CO_2 Uncombusted	(lb/hr)	89.44
	(tpy)	391.75
CH_4 Uncombusted	(lb/hr)	2.50
	(tpy)	10.93
CO_2 Combusted	(lb/hr)	1546.27
	(tpy)	6772.65
N_2O	(lb/hr)	0.002
	(tpy)	0.011
CO_{2e} Emissions	(lb/hr)	1688.87
	(tpy)	7397.23

Uncombusted CO_2

$$\text{Uncombusted } CO_2 \text{ Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(10.06\frac{moles}{100\ moles}\right)\left(44\frac{lb\ CO_2}{mole}\right)}{\left(379\frac{scf}{mole}\right)} = 89.44\ \frac{lb}{hr}$$

Uncombusted CH_4

$$\text{Uncombusted } CH_4 \text{ Emission Rate } \frac{lb}{hr} = \frac{\left(7{,}656\frac{scf}{hr}\right)\left(38.61\frac{moles}{100\ moles}\right)\left(16\frac{lb\ CH_4}{mole}\right)\left(1-\frac{98\%}{100}\right)}{\left(379\frac{scf}{mole}\right)} = 2.5\ \frac{lb}{hr}$$

Combusted CO_2

$$\text{Combusted } CO_2 \text{ Emission Rate} = \frac{\left[\sum_i (CarbonCount_i)\left(C_i\frac{mole}{100\ moles}\right)\right]\left(7{,}656\frac{scf}{hr}\right)\left(44\frac{lb\ CO_2}{mole}\right)\left(\frac{98\%}{100}\right)}{\left(379\frac{scf}{mole}\right)} = 1{,}546.27\frac{lb}{hr}$$

N_2O

$$N_2O \text{ Emission Rate} = \frac{\left(0.0001\frac{Kg\ N_2O}{MMBtu}\right)\left(1000\frac{g}{kg}\right)\left(7{,}656\frac{scf}{hr}\right)\left(\frac{1423\ Btu}{scf}\right)}{\left(454\frac{g}{lb}\right)\left(1000000\frac{Btu}{MMBtu}\right)} = 0.002\frac{lb}{hr}$$

CO_{2e}

$$Emission\ Rate = \left(89.44\frac{lb}{hr} + 1{,}546.27\frac{lb}{hr}\right) + \left(2.5\frac{lb}{hr}\right)(21GWP) + \left(0.002\frac{lb}{hr}\right)(310GWP) = 1{,}688.87\frac{lb}{hr}$$

Emission Unit SBC3B-320
C-3 Concrete Tank

EPA United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

EMISSIONS UNIT DESCRIPTION FOR VOC EMITTING SOURCES (EUD-2)

A. General Information

Emissions unit ID SBC3B-320 Description Concrete Tank no roof

SIC Code (4-digit) 1311 SCC Code 30600505

B. Emissions Unit Description

Equipment type Concrete Storage Tank Temporary source: ___Yes X No

Manufacturer N/A Model No. _____

Serial No. _____ Installation date ____/____/_____

Articles being coated or degreased _____

Application method _____

Overspray (surface coating) (%) _____ Drying method _____

No. of dryers _____ Tank capacity (degreasers) (gal) _____

C. Associated Air Pollution Control Equipment

Emissions unit ID _____ Device Type _____

Manufacturer _____ Model No _____

Serial No. _____ Installation date ____/____/_____

Control efficiency (%) _____.___ Capture efficiency (%) _____.___

Air pollutant(s) controlled _____ Efficiency estimation method _____

D. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) _____.____ Inside stack diameter (ft) _____.____

Stack temp (F) _____.____ Design stack flow rate (ACFM) _____.____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec)

E. VOC-containing Substance Data

List each VOC-containing substance consumed, processed or produced at the emissions unit that is emitted into the air. In the name column, if providing a brand name, include the name of the manufacture; if the substance contains HAP, list the constituent HAP.

Substance Name (Chemical, Brand Name)	CAS No.	Substance Type	Actual Usage (gal/yr)	Max Usage (gal/day)	Max Usage (bbl/week)	VOC Content (lb/gal)
Produced Water/ Oil Evaporation		**Gas**	**See Mass Balance**	**See Mass Balance**	**400**	**See Mass Balance**

United States Environmental Protection Agency

OMB No. 2060-0336, Approval Expires 06/30/2015

Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID SBC3B-320

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	**7.934**	**1.811**	**7.934**	
Benzene	**0.047**	**0.011**	**0.047**	**71-43-2**
Toluene	**0.106**	**0.024**	**0.106**	**108-88-3**
Ethylbenzene	**0.045**	**0.010**	**0.045**	**100-41-4**
Xylenes	**0.116**	**0.026**	**0.116**	**1330-20-7**
n-Hexane	**0.578**	**0.132**	**0.578**	**110-54-3**
CO_2	**0.015**	**0.003**	**0.015**	
CH_4	**0.060**	**0.014**	**0.060**	
CO_2e	**1.283**	**0.293**	**1.283**	

C-3 Concrete Tank Emissions

Emission unit SBC3B-320 is a concrete tank open to the atmosphere that stores fluid brought to the surface during well workover and completion activities. The use of the tank is highly variable but is estimated at a weekly throughput of 400 barrels. The liquids stored in the tank are mostly water with an estimated composition of one mole percent oil. Oil that comes to the surface of the tank is skimmed and added to the battery. Emissions from the tank were estimated using Water9 V3. The Water9 emission model does not account for recovery from skimming the tank, so the estimates are highly conservative. The concrete tank composition was estimated using the method outlined below.

Oil Composition- The oil analysis for C-1 only reports constituents through C10+. The C10+ fraction represents 75.96 mole% and 88.12 weight % of the oil sample. A Gaussian distribution was used to speciate the C10+ constituents in an effort to more accurately represent the C10+ fraction volatility of the oil.

The average molecular weight of the C1-Battery oil sample is 217.8, while the average molecular weight of the C10+ fraction is 252.67. The average molecular weight for C10+ falls between that of C17 and C18, and as such, the mean value for the Gaussian distribution based on carbon number was chosen to be between C17 and C18 constituents.

$$Mole\ \% = \frac{1}{V * \sqrt{2 * pi}} * e^{\left(-\left(\frac{1}{2}\right)*\left(\frac{x-u}{V}\right)^2\right)} * Factor + Y\ shift$$

Where V is the Standard Deviation, u is the mean, x is the number of carbons in the hydrocarbon, Factor is used to increase the area under the curve from one to the C10+ Mole percent and Y shift is used to elevate the range from a base value of zero.

Table 1 Distribution Equation Values

Equation Parameters	
Standard Deviation (V)	2.2
Mean(u)	17.22
Factor	36.2
Y shift	2.208

The Factor, Standard Deviation and Y shift values were manipulated incrementally so that the representative composition matched the average molecular weight, Mole % of C10+ species and average molecular weight of C10+ constituents of those reported by the oil sample analysis.

Table 2 Oil composition

Marathon - C-1 Battery #2 Treater Pressurized Crude oil 11/4/2011 By AMERICAN MOBILE RESEARCH, Inc.	
Sample MW	**217.82**
Estimated MW	217.86
Sample C10+	**75.96**
Estimated C10+	75.94
Sample MW C10+	**252.68**
Estimated Average MW C10+	252.71

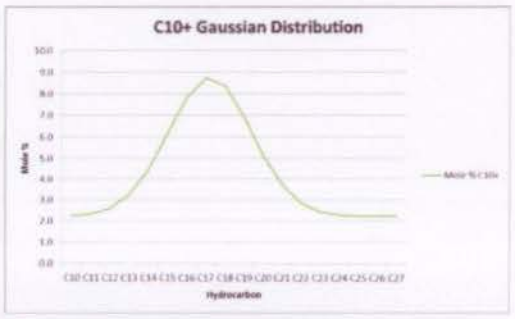

Figure 1 C10+ estimated distribution

The resulting distribution of the C10+ fraction is provided below in the oil composition columns. The final concrete tanks composition columns show the values that were entered into the Water9 simulation.

Table 3 Water9 input/output

Species	Water Composition		Oil Composition		Final Concrete Tanks Composition*		Water9 Estimated Emissions	
	mole %	PPM	mole %	PPM	mole %	PPM	Mg/yr	tpy
Water	99.000	990000.000	0.000	0.00	99.000	990000.000		0.000
Hydrogen Sulfide	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000
Carbon Dioxide	0.000	0.000	0.039	390.00	0.000	3.900	**0.014**	0.015
Nitrogen	0.000	0.000	0.002	20.00	0.000	0.200		--
Methane	0.000	0.000	0.166	1660.00	0.002	16.600	0.055	0.060
Ethane	0.000	0.000	0.093	930.00	0.001	9.300	0.031	0.034
Propane	0.000	0.000	0.260	2600.00	0.003	26.000	0.086	0.095
Isobutane	0.000	0.000	0.159	1590.00	0.002	15.900	0.053	0.058
Butane	0.000	0.000	0.438	4380.00	0.004	43.800	0.145	0.160
Isopentane	0.000	0.000	0.511	5110.00	0.005	51.100	0.169	0.186
Pentane	0.000	0.000	0.564	5640.00	0.006	56.400	0.187	0.206
Hexane	0.000	0.000	0.794	7940.00	0.008	79.400	**0.525**	0.578
Heptane	0.000	0.000	4.119	41190.00	0.041	411.900	1.360	1.496
Octane	0.000	0.000	9.365	93650.00	0.094	936.500	3.100	3.410
Nonane	0.000	0.000	5.777	57772.00	0.058	577.720	1.000	1.100
Decane	0.000	0.000	2.238	22380.92	0.022	223.809	0.169	0.186
Benzene	0.000	0.000	0.130	1300.00	0.001	13.000	0.043	0.047
Toluene	0.000	0.000	0.291	2910.00	0.003	29.100	0.096	0.106
Ethylbenzene	0.000	0.000	0.123	1230.00	0.001	12.300	0.041	0.045
p-Xylene	0.000	0.000	0.299	2990.00	0.003	29.900	**0.105**	0.116
o-Xylene	0.000	0.000	0.071	710.00	0.001	7.100		--
m-Xylene	0.000	0.000	0.048	480.00	0.000	4.800		--
2,2,4-Trimethylpentane	0.000	0.000	0.104	1040.00	0.001	10.400	0.034	0.038
2-Methylpentane	0.000	0.000	0.568	5680.00	0.006	56.800		--
3-Methylpentane	0.000	0.000	0.226	2260.00	0.002	22.600		--
Undecane	0.000	0.000	2.329	23286.25	0.023	232.862	0.064	0.071
dodecane	0.000	0.000	2.601	26012.72	0.026	260.127	0.021	0.023
Tridecane	0.000	0.000	3.251	32508.45	0.033	325.084	0.010	0.011
Tetradecane	0.000	0.000	4.457	44571.39	0.045	445.714	0.003	0.003
Pentadecane	0.000	0.000	6.153	61533.24	0.062	615.332	0.001	0.001
Hexadecane	0.000	0.000	7.837	78368.37	0.078	783.684	0.000	0.000
Heptadecane	0.000	0.000	8.740	87396.74	0.087	873.967	0.000	0.000
Octadecane	0.000	0.000	8.373	83725.31	0.084	837.253	0.000	0.000
Nonadecane	0.000	0.000	6.940	69400.06	0.069	694.001	0.000	0.000
Eicoscanes+	0.000	0.000	23.020	230200.000	0.230	2302.000	0.000	0.000

*Tank contents estimated to be 98.9% water and 1.1% oil by volume

Air emissions are based on a throughput of .10486 liter per second flow rate through an oil film unit

-- indicates species were not available for Water9 inputs so amounts were added to counterparts in same colored blocks bolded species received mole% of missing species

Emissions- The summary of emissions from the Water9 simulation is in table 3 under the water9 estimated emissions column and in table 4 below.

Table 4 Water9 emission summary

Emission Summary E-5 Water Tanks

Species	lb/hr	tpy
VOCs	1.811	7.934
n-Hexane	0.132	0.578
Benzene	0.011	0.047
Toluene	0.024	0.106
Ethylbenzene	0.010	0.045
Xylene	0.026	0.116
SO_2	0.000	0.000
CO_2	0.003	0.015
CH_4	0.014	0.060
CO_2e	0.293	1.283
H_2S	0.000	0.000
HAPs	0.212	0.929

AMERICAN MOBILE RESEARCH, INC.

P.O. BOX 2909
CASPER, WYOMING 82602

(307) 235-4590 PHONE
(307) 265-4489 FAX

EXTENDED HYDROCARBON (GLYCALC) LIQUID STUDY

CERTIFICATE OF ANALYSIS

Company ..... **Marathon**
Lab Number CR-11584
Date Sampled 10-13-2011
Study Number CR-7
Date Tested 11-4-2011

Sample Identification ..... **MARATHON - C-1 BATTERY #2 TREATER PRESSURIZED CRUDE OIL**

Sample Location ..... WYOMING
Sample Pressure ..... 18 PSIG
Type Sample ..... SPOT
Test Method ..... GPA 2186
Sample Temperature ..... 138 F
County ..... FREMONT
Sampling Method GPA-2174

Components	Mole %	Weight %	Liq. Vol. %
Hydrogen Sulfide	0.000	0.000	0.000
Oxygen	0.000	0.000	0.000
Carbon Dioxide	0.039	0.008	0.008
Nitrogen	0.002	0.000	0.000
Methane	0.166	0.012	0.034
Ethane	0.093	0.013	0.030
Propane	0.260	0.053	0.086
iso-Butane	0.159	0.042	0.063
n-Butane	0.438	0.117	0.166
iso-Pentane	0.511	0.169	0.225
n-Pentane	0.564	0.187	0.246
Hexanes	0.794	0.314	0.393
Heptanes	4.119	1.895	2.290
Octanes	9.365	4.911	5.782
Nonanes	5.772	3.399	3.914
Decanes+	75.962	88.119	85.941
Benzene	0.130	0.047	0.044
Toluene	0.291	0.123	0.117
Ethylbenzene	0.123	0.060	0.057
Xylenes	0.418	0.204	0.196
n-Hexane	0.690	0.273	0.342
2,2,4-Trimethylpentane	0.104	0.055	0.065
Totals	100.000	100.000	100.000

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
2-Methylpentane	0.568	0.225	0.281
3-Methylpentane	0.226	0.090	0.112
n-Hexane	0.690	0.273	0.342
2,2,4-Trimethylpentane	0.104	0.055	0.065
Benzene	0.130	0.047	0.044
Toluene	0.291	0.123	0.117
Ethylbenzene	0.123	0.060	0.057
m-Xylene	0.048	0.023	0.023
p-Xylene	0.299	0.146	0.140
o-Xylene	0.071	0.035	0.033

API GRAVITY AT 60/60 F, calculated	38.6
SPECIFIC GRAVITY AT 60/60 F, calculated	0.83177
RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION, calculated	0.85285
AVERAGE MOLECULAR WEIGHT	217.817
AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION, calculated	252.676
TRUE VAPOR PRESSURE AT 100 F, PSIA, calculated	10.326
AVERAGE BOILING POINT, F, calculated	469.080
CUBIC FEET OF GAS / GALLON OF LIQUID, as Ideal Gas, calculated	16.942
BTU / GALLON OF LIQUID AT 14.73 PSIA, calculated	126,010.00
LBS / GALLON OF LIQUID, calculated	6.935

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

James A. Kane, President
American Mobile Research, Inc.

Display

WASTEWATER TREATMENT SUMMARY I 09-14-2012 11:14:16

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COMPOUND	RATE (g/s)	Fraction Air	Removal	Exit	Adsorb	error	emissions
BENZENE	1.36E-03	1.	.	.	0.0000	0.0000	(4.30E-02 Mg/yr)
BUTANE	4.59E-03	1.	.	.	0.0000	0.0000	(1.45E-01 Mg/yr)
ETHANE	9.75E-04	1.	.	.	0.0000	0.0000	(3.08E-02 Mg/yr)
ETHYLBENZENE	1.29E-03	1.	.	.	0.0000	0.0000	(4.07E-02 Mg/yr)
HEPTANE(-n)	4.32E-02	1.	.	.	0.0000	0.0000	(1.36E+00 Mg/yr)
HEXADECANE N	0.00E+00	.	.	1.	0.0000	0.0000	(0.00E+00 Mg/yr)
HEXANE(-n)	1.67E-02	1.	.	.	0.0000	0.0000	(5.25E-01 Mg/yr)
HYDROGEN SULFIDE	1.05E-24	1.	.	.	0.0000	0.0000	(3.31E-23 Mg/yr)
METHANE	1.74E-03	1.	.	.	0.0000	0.0000	(5.49E-02 Mg/yr)
OCTANE	9.82E-02	1.	.	.	0.0000	0.0000	(3.10E+00 Mg/yr)
PENTANE	5.91E-03	1.	.	.	0.0000	0.0000	(1.87E-01 Mg/yr)
PROPANE	2.73E-03	1.	.	.	0.0000	0.0000	(8.60E-02 Mg/yr)
TOLUENE	3.05E-03	1.	.	.	0.0000	0.0000	(9.62E-02 Mg/yr)
TRIMETHYLPENTANE 2,2,4	1.09E-03	1.	.	.	0.0000	0.0000	(3.44E-02 Mg/yr)
WATER	1.04E+02	1.	.	.	0.0000	0.0000	(3.27E+03 Mg/yr)
XYLENE	3.32E-03	.75839	.	.2416	0.0000	0.0000	(1.05E-01 Mg/yr)
TETRADECANE	1.01E-04	.00215	.	.9978	0.0000	0.0000	(3.17E-03 Mg/yr)
DODECANE (C12 linear)	6.75E-04	.02475	.	.9752	0.0000	0.0000	(2.13E-02 Mg/yr)
UNDECANE (C11 linear)	2.03E-03	.08323	.	.9168	0.0000	0.0000	(6.41E-02 Mg/yr)
DECANE (C10 linear)	5.36E-03	.22819	.	.7718	0.0000	0.0000	(1.69E-01 Mg/yr)
ISOPENTANE	5.36E-03	1.	.	.	0.0000	0.0000	(1.69E-01 Mg/yr)
ISOBUTANE	1.67E-03	1.	.	.	0.0000	0.0000	(5.26E-02 Mg/yr)
NONANE C9H20	3.18E-02	.52462	.	.4754	0.0000	0.0000	(1.00E+00 Mg/yr)
CARBON DIOXIDE	4.30E-04	1.	.	.	0.0000	0.0000	(1.36E-02 Mg/yr)

Exit | Page UP | Page DOWN | page 1 of 2 pages. | Print | File | ss TSV | Help

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Display

TRIDECANE (C13 linear)	3.16E-04	.00928	.	.9907	0.0000	0.0000	(9.98E-03 Mg/yr)
PENTADECANE (C15 linear)	3.70E-05	.00057	.	.9994	0.0000	0.0000	(1.17E-03 Mg/yr)
HEPTADECANE (C17 linear)	0.00E+00	.	.	1.	0.0000	0.0000	(0.00E+00 Mg/yr)
OCTADECANE (C18 linear)	0.00E+00	.	.	1.	0.0000	0.0000	(0.00E+00 Mg/yr)
NONADECANE (C19 linear)	0.00E+00	.	.	1.	0.0000	0.0000	(0.00E+00 Mg/yr)
EICOSCANE (C20 linear)	0.00E+00	.	.	1.	0.0000	0.0000	(0.00E+00 Mg/yr)

TOTAL ALL COMPOUNDS	1.04E+02 g/s air emissions
TOTAL ALL COMPOUNDS	3.28E+03 Mg/yr air emissions

Wastewater Collection and Treatment Units

File View Screen Display Units Waste Help notes Return

EICOSCANE (C20 linear)

Shift waste | Insert row | Delete the compound | Return from waste edit | HELP

.1048622

All compound concentrations in ppm	waste 1	waste 2	waste 3	waste 4	waste 5	waste
flow (l/s)	.1048622					
code						
drop (cm)						
radius (cm)						
BENZENE	13					
BUTANE	43.8					
ETHANE	9.3					
ETHYLBENZENE	12.3					
HEPTANE(-n)	411.9					
HEXADECANE N	783.6857					
HEXANE(-n)	158.8					
HYDROGEN SULFIDE						
METHANE	16.6					
OCTANE	936.5					
PENTANE	56.4					
PROPANE	26					
TOLUENE	29.1					
TRIMETHYLPENTANE 2,2,4	10.4					
WATER	990000					
XYLENE	41.8					
TETRADECANE	445.7139					
DODECANE (C12 linear)	260.1272					
UNDECANE (C11 linear)	232.8625					
DECANE (C10 linear)	223.809					
ISOPENTANE	51.1					
ISOBUTANE	15.9					
NONANE C9H20	577.72					
CARBON DIOXIDE	4.1					
TRIDECANE (C13 linear)	325.085					
PENTADECANE (C15 linear)	615.3324					
HEPTADECANE (C17 linear)	873.967					
OCTADECANE (C18 linear)	837.2531					
NONADECANE (C19 linear)	694.001					
EICOSCANE (C20 linear)	23.02					

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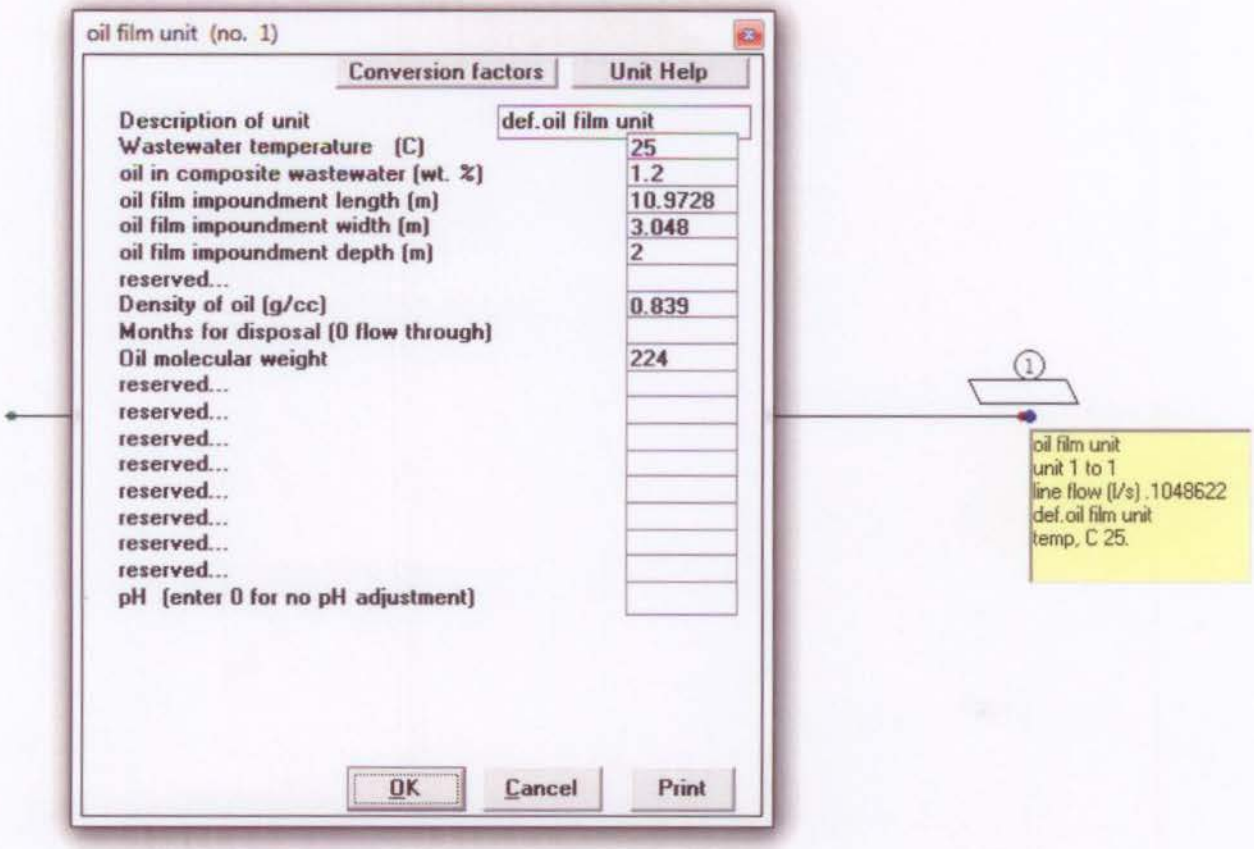
sheet 1 | sheet 2 | sheet 3 | sheet 4 | sheet 5 | sheet 6 | sheet 7

divert flow from 1 | Divert 1 to waste


oil film unit (no. 1)
Conversion factors
Unit Help
Description of unit
def.oil film unit
Wastewater temperature (C)
25
oil in composite wastewater (wt. %)
1.2
oil film impoundment length (m)
10.9728
oil film impoundment width (m)
3.048
oil film impoundment depth (m)
2
reserved...
Density of oil (g/cc)
0.839
Months for disposal (0 flow through)
Oil molecular weight
224
reserved...
reserved...
reserved...
reserved...
reserved...
reserved...
reserved...
reserved...
pH (enter 0 for no pH adjustment)
OK
Cancel
Print
1
oil film unit
unit 1 to 1
line flow (l/s) .1048622
def.oil film unit
temp, C 25.